

## **Historic, archived document**

Do not assume content reflects current scientific knowledge, policies, or practices.



# FARMERS' BULLETIN

Has been rev.  
--see rev.ed.  
binders at  
end of file.

WASHINGTON, D. C.

653

APRIL 7, 1915.

Contribution from the Office of Experiment Stations, A. C. True, Director.

## HONEY AND ITS USES IN THE HOME.

By CAROLINE L. HUNT, *Expert in Nutrition*, and HELEN W. ATWATER, *Assistant in Nutrition, Office of Experiment Stations.*

### INTRODUCTION.

In the days before trade with the Tropics introduced cane sugar into temperate regions honey was by far the most common sweet substance available for human food. In very early times men discovered that the material deposited by honeybees in hollow trees and in the crevices of rocks was a valuable and agreeable food and learned to appropriate it to their own use. Such wild honey is still gathered in Palestine and in the less advanced parts of Africa, in Asia, and in South and Central America, that from Peru making an important article of export. Bee trees, which were considered a prize in pioneer times in this country, are still valued in some remote rural regions, and not infrequently people living in country or village take the comb from a colony of bees which has settled in a corner under the weatherboarding of a building or some similar place.

The naturally built combs are of course very irregular, and this fact, combined with the difficulty of driving the bees out, is likely to cause great loss of honey and to injure the colony. The idea of getting bees to build their combs in some special and convenient place of man's providing—that is, in a hive—seems to have occurred very long ago to people almost everywhere, and the custom of “keeping” bees instead of seeking out their haunts was the first step toward securing a better and more economical supply of honey. Bee-keeping is now almost universal except in regions of extreme cold and among savage tribes.

The hive, once adopted, has undergone many changes, all of them intended to direct the activities of the bee to the service of man. Up to 60 or 70 years ago the hives most commonly in use among nations of European origin were the round and slightly pointed

NOTE.—This bulletin is of interest to housekeepers throughout the country.

ones made of tightly braided straw or willow, which are known as skeps and which have become a generally recognized symbol of industry. In these the combs are built irregularly, and since they are fastened firmly to the top and sides they can not be handled separately. There is no provision for separating the brood cells

where the bees rear their young from that extra supply of honey which they instinctively store in times when the nectar flows freely and which is the only part that can be used as food for man. The destruction of the colony at the time of taking the honey was formerly a common practice.

The hives now most commonly used in this country are of the type invented by Langstroth in 1851. They consist of rectangular wooden boxes or chests from the sides of which, at a point near the top, removable frames for the combs are suspended. One or more supers or extra parts of the hive are kept on hand, so that new ones can from time to time be placed on the part of the hive used for brood rearing, and thus the amount of honey-storing space can be enlarged when the bees are most active in gathering nectar. The modern hives are sometimes supplied with queen excluders, which permit only the worker bees, which are smaller than

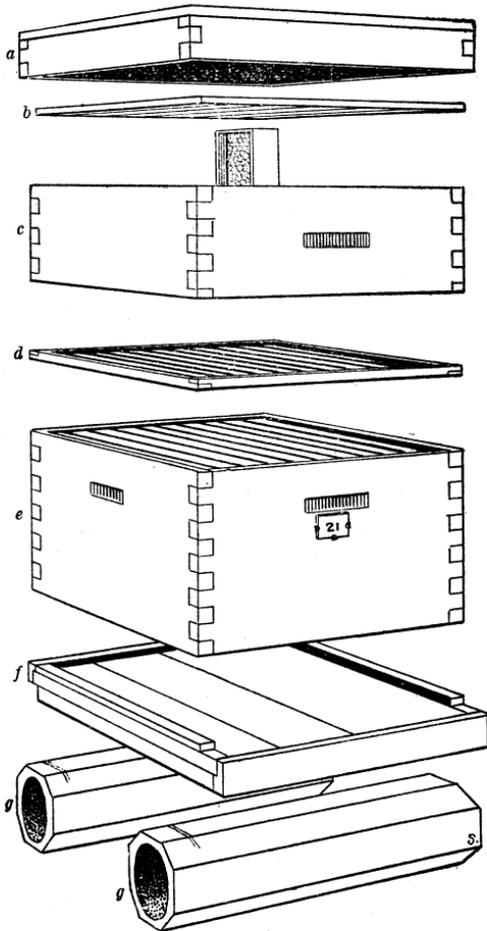


FIG. 1.—A 10-frame hive with comb-honey super and perforated zinc queen excluder. (From Phillips.) (a) Cover. (b) Inner cover. (c) Super. (d) Queen excluder. (e) Hive body for brood. (f) Bottom. (gg) Supports.

the queen, to pass from the lower hive body into the place reserved for the surplus honey, thus preventing the rearing of brood in the supers. There is also an arrangement by which all of the bees can be trapped, and thus kept out of the supers when the honey is to be removed. (See fig. 1.)

Not long after the introduction of Langstroth's hives gave an impetus to commercial beekeeping a centrifugal honey extractor was invented, which greatly improved the method of removing honey from the comb. Formerly honey was strained from the combs, and such honey was a rather uncertain product and often contained various kinds of refuse, such as parts of dead bees, etc., which could not be easily removed. When the modern centrifugal machines are used, the wax caps which close the cells of the combs are cut off, and the uncapped combs are put into the extractor, which throws the liquid honey out by centrifugal force and lets it run off at the bottom of the machine. Honey which has just been extracted may contain some pieces of wax capping and other impurities. Hence, extractors are usually provided with strainers which remove the larger particles as the honey passes out. The particles are lighter than honey. Honey is therefore usually allowed to stand until they rise to the top in scum, and the latter is removed before the honey is put into cans or bottles.

Because extracted honey is easily adulterated, the public was formerly rather suspicious of its purity. Recently, however, owing to pure-food legislation, to the watchfulness of the Bureau of Chemistry of the United States Department of Agriculture and State agencies charged with the carrying out of pure-food laws, and also to the efforts of honey producers, the practice of adulterating honey has become dangerous and unprofitable; confidence in the extracted article has been largely restored, and there is relatively little adulterated extracted honey on the market.

Although the greater part of the honey produced is now sold as extracted honey, there is still a good market for comb honey, and since appearance is an especially important feature in judging it, the producer takes special pains to have the combs regular in shape and attractive in color. Comb honey can not be adulterated except by processes which cost more than the retail price, and therefore the purchaser may be sure that comb honey is the product of the hive.

There are two kinds of natural honey, known as floral or normal, and honeydew or abnormal, the former being made from nectar, a sweet liquid secreted by flowers, and the latter from honeydew, a sweet substance deposited on the leaves of plants by plant lice and other insects. Unless otherwise stated, the term "honey" when used in this bulletin may be understood to refer to the kind made from nectar, or to that in which the quantity of honeydew is so small that it does not greatly affect the character of the product.

The chief materials that the worker bees bring to the hive are nectar, pollen, and propolis. They collect the pollen on the hairs on their bodies, place it in the so-called pollen baskets on their legs,

and thus carry it back to the hive to be deposited near the brood cells. This pollen is rich in nitrogenous material and is important as food for the young and developing bees (larvæ). A few grains usually find their way into the honey cells. Propolis or bee glue is obtained from the gums exuding from trees and shrubs. It is taken to the hive in the same way as pollen and is used to make the hive waterproof and sometimes to strengthen the edges of the comb. If any gets on the capping of the honey it tends to spoil the appearance of the combs; these traces of propolis are known as "travel stain."

Nectar is the material from which honey is made. The bees suck it out of the flower with their long tongues and swallow it into the honey sac where it undergoes some changes not yet well understood. It consists chiefly of sugar and water, the former constituting usually between one-fifth and two-fifths of the entire weight and the latter between three-fifths and four-fifths. With this substance are mixed small quantities of other materials, chiefly mineral matters, gums, and volatile bodies. To the latter the aroma and flavor of honey are chiefly due.

The changes by means of which nectar is transformed into the finished honey are technically known as "ripening." They take place partly in the honey sac of the bee, and partly in the cells of the comb, continuing even after the latter have been capped with wax. They consist mainly in removal of part of the water from the nectar, a task which the bees accomplish by warming the air of the hives and also by fanning the nectar in the cells, and in the change in the chemical nature of the sugars, which will be described later (see p. 5).

Wax is made in and secreted from special glands on the abdomen of the worker bee. Several pounds of honey are used in producing a pound of wax, and a high temperature must be kept up in the hive by the bees while it is being made. Because of the cost of wax secretion beekeepers usually try to arrange that the bees shall have little comb building to do except when comb honey is being produced.

#### FOOD VALUE OF HONEY.

Like most foods, honey, although preserving its general character, varies more or less from the average composition. The variations are of interest to the housekeeper in so far as they may affect the food value or the way in which the honey can be used to the best advantage in cookery. They may also be of decided interest to the food inspector, as departures from the usual composition may help him to detect the presence of adulterants.

So far as its food value is concerned honey may be roughly described as a sirup with a distinctive flavor and aroma made up of 4 parts sugar to 1 part water. There are several kinds of sugars present in honey, including cane sugar (sucrose), grape sugar

(dextrose), and fruit sugar (levulose); the last two together being called invert sugar. Some dextrin is also present as well as a variety of other substances in very small amounts. Included among them are nitrogenous substances (protein) which occur in quantities too minute to affect the food value of honey for man. Some of the other substances present in minute quantity, namely volatile oils, or other bodies of pronounced odor or flavor from the nectar, are valuable because they influence the flavor and aroma of the honey.

According to data gathered by the Bureau of Chemistry<sup>1</sup> honey, on an average, contains in round numbers per hundred parts 18 parts water, 78 parts carbohydrates (including 76 parts sugar and 2 parts dextrin), 0.2 part mineral substance, or ash, and nearly 4 parts of undetermined substances such as pollen grain, gum, bee glue, formic acid and volatile oils, and other flavor substances. These are average values and there is, of course, considerable variation in individual honeys. For instance, the proportion of water varies from about one-eighth to one-fourth of the total weight of the honey, being influenced by the moisture in the air at the time the honey is produced and the dryness of the atmosphere in which the honey is kept afterwards. Samples of honey from conspicuously dry localities (the southwestern part of the United States, for instance) and honeys made in other localities in very dry weather have a relatively low water content.

The most abundant of the mineral substances in honey are magnesia, lime, phosphoric acid, and iron. Since honey contains less than 1 part per hundred of mineral matter, it is obvious that even if eaten in large amounts it could not contribute greatly to the total mineral matter of the diet. However, it is claimed that unless care is taken in selecting foods there is a possibility that the diet may contain too little lime, and for this reason it is worth noting that honey contains this constituent. In respect to its ash content it is more comparable with maple sirup than with cane sugar from which the mineral substances originally present in the plant juices have been removed during the process of refining.

The percentage of the different sugars varies more or less, but under any circumstance the amount of cane sugar is small (some 2 parts per hundred) and less than in the nectar from which the honey is made. The proportion of dextrose (grape sugar) and levulose (fruit sugar) making up the total invert sugar varies in honey as it does in the nectar from which it is made, but this is of no importance in planning meals. However, it is of practical importance for the reason that it determines the character and appearance of the honey. Honey will granulate easily if the proportion of dextrose is large, but this is

---

<sup>1</sup> U. S. Dept. Agr., Bur. Chem. Bul. 110.

not the case if levulose predominates. For example, alfalfa honey which contains a high percentage of dextrose often forms such a solid mass of crystals that it is sold in cakes. This may be an advantage sometimes. Thus, the solid alfalfa honey can be used for such purposes as filling for layer cakes, for which liquid honey would not be so suitable because it would run out. The proportion of dextrin present in normal or nectar honey is so small that it affects neither food nor cooking values. Abnormal or honeydew honey, however, contains so much dextrin that it requires special handling in cooking. This is a matter of interest to professional bakers rather than to housekeepers, as such honey is not commonly used in the home.

Since the principal ingredient of honey is sugar, it is obvious that it should be classed with the fuel foods which supply the body with the energy it needs for the various tasks it performs rather than those whose function is to build and repair the body—that is, the “tissue formers,” as they are sometimes called. If honey contained no water its energy value would be practically the same, pound for pound, as that of cane sugar. However, since about one-fifth of its total weight is water, it follows naturally that its energy value is one-fifth less than that of cane sugar, being 1,485 calories per pound.

In planning meals, particularly in hospitals, children's homes and other institutions where large quantities are required, it is often convenient to have some quick and fairly accurate method of estimating the relative value of different articles of diet which are used in similar ways. For this reason it is worth remembering that an ordinary tablespoonful of honey which weighs a trifle over an ounce will furnish the body 100 calories. The same amount of energy would be supplied by five-sixths of an ounce of sugar, by  $1\frac{1}{4}$  ounces of molasses, or by a little less than an ounce of preserves (such as orange marmalade).

#### FLAVOR OF HONEY.

The flavor and aroma of honey depend largely upon the blossoms from which the nectar is obtained. The nectar of each kind of flower contains a distinctive combination of oils and other substances which gives the blossoms their special fragrance, and these substances are retained in the honey made from the nectar. It is practically impossible to prevent bees from visiting more than one kind of flower during a given period, and, strictly speaking, almost every kind of honey is made from a mixture of different nectars. Nevertheless, when the hives are situated near a large supply of one sort of blossom, its nectar usually predominates and its flavor and aroma can be easily recognized in the honey. It is perfectly correct, therefore, to speak of basswood honey, fruit-blossom honey, buckwheat honey, etc.

Different localities naturally produce different kinds of honey, and different kinds may be produced in the same locality at different seasons, according to the kinds of flowers which abound. Several famous European honeys, among them the choice French variety from Narbonne, owe their characteristic aromatic flavor to wild thyme and other flowers of the mint family. In orange honey from districts where orange blossoms abound the peculiar aroma and flavor of the flowers are very clearly marked. Sage and clover honeys are well-known American varieties in which the characteristics of the nectar are easily and pleasantly recognized.

Choosing between honey from different flowers is mainly a matter of taste; and taste in honey, as in many other things, seems to depend more on what one has been accustomed to than on any real superiority. For example, it sometimes happens that a person who has always used buckwheat honey with its full-bodied, rather acid flavor, imagines that a mild, light honey with less of the characteristic "comby" taste must be adulterated, whereas a person who is familiar only with some such delicate honey as white clover or alfalfa may consider buckwheat very inferior, or even fancy that it is not genuine floral honey.

The relative abundance of different flowers and consequently the flavor of the honey vary so greatly in different seasons that beekeepers can not count on a regular yield of uniform honey, and their patrons may be disappointed to find that the honey of one year is different from that of the year before. To overcome this difficulty many of the best wholesale dealers have recently adopted the practice of mixing several honeys to produce a blend. This process is like that adopted long ago in the case of teas. To blend honeys so that the mixture will be generally acceptable requires a great deal of skill, but when the consumer has found a blend which pleases him, he is more likely to be able to get honey of that flavor season after season than if he depends on unmixed honeys.

#### WHOLESOMENESS.

Because the chemical change effected by the bee in the sugars of the nectar is the same as that effected by digestive ferments, and the principal sugars may therefore be considered to have undergone the first step of digestion, honey is often said to contain predigested sugar, and to be more wholesome than cane sugar. There is no reason, however, to believe that the healthy human body is not equal to the task of digesting any sugar, so a special claim made for the wholesomeness of honey on this ground seems unimportant. It is generally believed that the energy from sugar is liberated for the use of the body more quickly than that from such other fuel foods as

starch and fat. Hence it is said to delay the oncoming of fatigue during great muscular exertion. For this reason some form of sweet is included in almost all army rations and is often used by persons undergoing severe physical exertion, such as mountaineers and athletes. Although no experiments have been made to test the value of honey in this respect, it seems safe to suppose that it would have the same good effect as other sweets.

Everyone knows that eating too much ordinary sugar upsets digestion. The differences in the effects of too much honey and too much cane sugar are rather complicated, but it is safe to say that eating too much of either should be avoided, even by healthy people.

For some persons suffering from serious digestive disturbance honey may be a safer form of sugar than cane sugar, but with other forms of indigestion the opposite is true; it depends upon the particular form of disturbance, and such matters should be decided by a skillful physician for each individual case. For persons of very delicate digestion the particles of wax in comb honey may cause trouble, as it is believed that the digestive processes do not have any effect on them. For normal persons, however, the wax should be as harmless as are the particles of indigestible material contained in many other wholesome foods.

Honey is sometimes said to have a mildly laxative effect, and the statement is doubtless true, as it is of many other food materials, especially those of vegetable origin. If a person had to live on a very limited number of foods, especially if he had a tendency to constipation, it might be wise to use honey rather generally in preference to other forms of sweet; but the effect of such small amounts of honey as would be used in an ordinary diet would hardly be worth taking into consideration. Bran biscuits made with honey instead of sugar (see p. 16) would owe any advantage they might have over the ordinary bran biscuit to the laxative effect of the honey.

Other medicinal qualities have been claimed for honey, particularly in older writings, and it still finds use in medicinal preparations, but no doubt more because of tradition and of the flavor and texture it imparts than for actual medicinal properties. From the standpoint of the honey industry this is a matter of little importance, for honey is regarded by the vast majority of its users as a food and not as a drug product.

Even if honey has no such specific medicinal advantages, this does not in the least lessen its general value as a wholesome, useful food-stuff, well worthy of even more extended use than it already has, not only because it is agreeable and economical in itself, but also because it introduces a pleasing variety and thus makes the diet more appetizing, and consequently more wholesome.

## ECONOMY OF HONEY AS FOOD.

Whether or not honey can be economically used in the diet as a source of nourishment depends of course upon its food value and its price as compared with other food for which it may be substituted. To compare food materials in these two respects is no easy task because, besides varying in price with time and place, they may differ widely in the kind and the quantity of the nutrients which they supply. If honey is compared with cane sugar at 7 cents a pound on the basis of the energy which it provides for the body, it should sell for not more than 6 cents a pound in order to be as economical. Comparing it on the same basis with butter at 40 cents a pound, it is evident that it might sell for 17 cents a pound and be equally economical as a source of energy.

The differences between the wholesale prices of comb honey and of extracted honey are much greater than those between the retail prices. A pound of extracted honey in a jar usually sells at retail for about the same as the average section of comb honey, which has a net weight of 14 ounces. On the other hand, the wholesale price of comb honey is usually about 50 per cent higher than that of extracted honey. The reason for this is that the producer of comb honey does far more of the work of getting his product ready for the final market than does the producer of extracted honey. As the sections leave his hands so they are passed over the counter to the housewife or other retail purchaser. Extracted honey, on the contrary, is sold by the producer to the bottler, not in pound lots but in 5-gallon cans or barrels. The bottler does the work of blending, liquefying, bottling, labeling, and packing. It is possible, therefore, for the consumer to save money by buying extracted honey at wholesale and avoiding the cost of the various kinds of work which prepare it for the retail market.

Where only small quantities of honey are used, the effort to buy in the cheapest market may cost more in energy than it saves in money. Where, however, large supplies are bought, the purchaser should try to get into direct communication with the producer and take advantage of the parcels post as a means of transportation. The names of dealers in his vicinity can often be obtained from the beekeepers' magazines, or by writing to the State inspector of apiaries. The names of State inspectors and often those of local dealers can be obtained by addressing the Bureau of Entomology of the United States Department of Agriculture.

Now that extracted honey is usually pure and of good quality, the advantage of comb honey lies chiefly in its attractiveness to the eye. Unless very great care is taken in extracting honey, some of the

volatile bodies on which its flavor depends will probably be lost. Hence it often happens that the flavor of comb honey is really slightly superior to the same kind extracted. Many persons think that the presence of the wax gives the honey a more pleasant consistency for table use. Whether these advantages are worth the extra cost each consumer must decide for himself.

Comb honey is commonly graded according to finish and color. It is described as Extra Fancy, Fancy, No. 1, or No. 2, according to the evenness with which the sections are filled, the freedom of the product from propolis or other stains, and the number of unsealed cells. It is graded according to color as white, light amber, amber, and dark. From the point of view of food value alone, finish and color are not of importance, though dark honeys are usually of stronger flavor.

In order to comply with the Federal Food and Drugs Act which applies to all goods shipped from one State to another, every section of honey and every package containing extracted honey must be marked with the net weight. In comb honey this is understood to be the weight of the comb and the honey and to exclude the weight of the wooden frame.

In choosing honey too much importance should not be attached to lightness of color, for some of the best varieties are dark; nor should granulation be thought to imply adulteration. The truth is that crystallization is more likely to occur in pure than in impure honeys, and some pure varieties, especially alfalfa honeys, granulate so easily that they are often sold to the consumer in solid form. The crystals can easily be dissolved by heating the honey, which should be done in a double boiler or other kind of water bath. If the temperature does not go beyond 160° Fahrenheit, there is little danger that either color or flavor will be affected.

Unless in a sealed package, honey should be kept in a dry place; otherwise it is likely to absorb moisture and spoil, for when dilute it will ferment or sour readily, as will any other similar sugar sirup. Heat and dryness are usually found together in the household, and ordinarily the safest places for honey are the warmest places; the least desirable is the refrigerator.

#### USES OF HONEY.

Honey is used both in its natural state and as an ingredient of cooked food. In this country it is more commonly used uncooked than cooked, and practically all comb honey is consumed in this way. Honey is much more commonly used in cookery in Europe than in America, though commercial bakers and confectioners in the United States use much larger quantities than many persons realize.

The simplest way of using honey is to serve it like jam or sirup with bread, breakfast cereals, boiled rice, pancakes, and other mild-

flavored foods. As ordinarily used on bread, an ounce of honey "spreads" as many slices as an ounce of jam. When it is to be used in the place of sirup some people dilute it by mixing it with hot water, which has the effect of making it not only less sweet but also easier to pour.

Honey or a mixture of honey and sugar sirup can be satisfactorily used for sweetening lemonade and other fruit drinks. Sirup of any kind is more convenient for this purpose than undissolved sugar, and when charged water is to be added it has a further advantage since it has less tendency to expel the gas. It is the custom of many housewives to keep a sirup for this purpose, particularly in hot weather, and variety can be secured by occasionally using honey.

Honey can be used in place of sugar for some kinds of preserving, and there is reason to believe that fruits cooked in it keep very well indeed. Bar-le-Duc currants, which form a very delicate and expensive article of commerce, are often made by cooking currants in honey. They are frequently served with cream cheese and crackers or other form of bread. A satisfactory substitute may be secured by serving honey and tart fruit, either cooked or uncooked, with cottage cheese and bread and butter. Three ounces of cottage cheese curd, two ounces of bread, two-thirds ounce of butter (either added to the curd or spread on the bread), two ounces of honey, and six ounces of strawberries or other watery fruit would make a reasonably well-balanced meal. Sometimes honey alone is served with cream cheese. Crisp crackers, spread with cream cheese and honey, form a good combination from the point of view of nutritive value and taste. Honey may be substituted for sugar in baking apples.

#### HONEY IN COOKERY.

When used in cookery honey does not always produce the same effect as corresponding quantities of sugar or molasses, and the reasons for some of the differences between them are not well understood. Careful experiments with various types of honeys and honey recipes were therefore made in the nutrition laboratory of the United States Department of Agriculture, in the hope of explaining such points. Most of the facts stated in the following paragraphs were obtained in this way, and all the recipes (pp. 15-26) were tested there.

The fact that honey consists principally of sugar and water and is slightly acid suggests that it is a suitable substitute for molasses in cookery. As a matter of fact, it can be used in the place of molasses in all forms of breads, muffins, and cakes, and makes a more delicately flavored product. It contains less acid than molasses, however, and so requires less soda when it is substituted for molasses in recipes which do not include sour milk or other acid, and the cook

must be careful about the amount of soda used. Many trials were made with different kinds of honey in this laboratory which showed that the allowance of soda to a cupful of honey very generally ranges between one-fourth and one-half of a level teaspoonful. Unless the cook is thoroughly familiar with her honey, she would do well to mix and bake a small sample of dough before she decides on the amount of soda to be put into the main portion.

When honey is to be substituted for common sugar it is desirable to know not only how it compares in sweetness, but also how much allowance must be made for the water which it contains. Assuming a cupful of good honey to measure one-half pint, it should weigh about 12 ounces. Of this, 9 to 10 ounces, roughly speaking, is sugar. A cupful of honey, therefore, corresponds to a little more than a cupful of cane sugar. Hence it is safe to estimate that a cupful of honey will sweeten a dish just about as much as a cupful of sugar. Besides the sugars, there is about one-fifth of a cupful of water in a cupful of honey. Theoretically, therefore, in making cake one should substitute honey for sugar cupful for cupful, and for each cupful of honey use one-fifth cupful less of the milk or other liquid which the recipe calls for. For practical purposes, however, it is accurate enough to consider that the water in a cupful of honey is one-fourth of a cupful. This rule was found to hold good with a large number of ordinary cake recipes which were tested in this laboratory. These facts, if kept in mind, make special honey recipes unnecessary and enable the cook with very slight calculation to modify ordinary ones so that honey can be used in place of sugar. Besides slightly changing the flavor of the cake, honey used in the place of sugar makes it keep moist longer. A honey cake made with butter will keep its quality until the butter grows rancid, and one made without butter will keep fresh for months and even improve in flavor. What is true of the cakes is also true of the dough; it can be kept almost indefinitely. Evidently, then, honey is especially useful in recipes without butter. For this reason, most of the honey cakes experimentally studied in this laboratory were made according to the following formula which is typical of Honig Kuchen, or German Christmas cake: Three-fourths cup honey, one-half cup sugar, two cups or more flour, one-fourth teaspoon powdered ginger, one-half teaspoon powdered cardamom seed, one teaspoon cinnamon, one-eighth teaspoon cloves, a speck white pepper, a pinch salt, one-fourth to one-half teaspoon soda, one tablespoon water, and two ounces blanched almonds cut in small pieces or chopped.

The directions for making the honey cakes, not only in the older cookbooks, but also in many modern bakers' manuals, are extremely elaborate; one of the purposes of the experiments made in this

laboratory was to determine how many of the suggested precautions are necessary.

Recipes usually direct that the honey be brought to the boiling point and then skimmed and cooled. This must be done with great care, for the honey is very likely to boil over. Experiments with a large variety of honeys such as are ordinarily purchased in the United States for household use, showed that nothing rises to the top during the boiling which can not be easily stirred back into the liquid. It seems likely therefore that the custom of boiling had its origin at the time when honey, or at least the grades bakers use, was much less carefully prepared than at present and contained impurities of many kinds. A cake made by stirring flour directly into cold honey was found to be in no way inferior to those made with honey which had been heated.

Some recipes found in the older cook books, particularly those of foreign origin, direct that the spices be boiled with the honey and give as a reason for this that the heating brings out their flavor and makes them "go further." The weight of this argument is obviously difficult to determine, but the work carried out in the Nutrition Laboratory gave no evidence that the short heating at the beginning is of special importance in comparison with the long heating which the materials must receive while the cake is being baked.

The older recipes almost invariably direct that the dough be kept for a certain length of time, sometimes one day, sometimes more, before the soda is added. So reliable an authority as König says that this is because, owing to the presence of bacteria, the acidity of the mixture increases with time, and that therefore more soda can be used after the dough has stood. To test this point, dough was mixed in this laboratory and analyzed by the Bureau of Chemistry; it was found to have 0.0775 per cent of acidity immediately after being mixed, and 0.1 per cent after four days' time. Another sample increased in six days from 0.108 per cent to 0.117 per cent, and during the following six days to 0.125 per cent. It seems probable, therefore, that the acid does usually increase; but even so, the question arises whether there is not in the beginning enough acid to act on soda sufficient to raise the cake. In order to determine this, two samples of dough were mixed. To No. 1 the soda was added at once and baking followed immediately. No. 2 was kept for a week, when the soda was added and the cake was baked. The second was neither lighter nor in any way superior to the first.

It is frequently stated that the dough can be more easily kneaded if it is allowed to stand several days. In order to test this point, a dough was mixed which was stiff enough to hold its shape, but which stuck to the hands and the molding board. After a week's time it

could be molded freely on an unfloured board without sticking to it. This argument for keeping the dough seems therefore to be sound.

It is sometimes said that the reason why cakes made with honey keep soft for a long time is that they absorb moisture from the air. To test this point a cake made according to the recipe already given was weighed at different intervals during  $7\frac{1}{2}$  months. The weight of the dough was 526 grams, the weight of the cake on the day of baking, April 17, 1913, was 499 grams after it had been removed from the pan, and at the final weighing on December 2 of the same year, it weighed 469.7 grams. The loss of weight was continuous during all this time, with the exception that in the late summer there was a slight increase in the weight, probably due to unusual dampness of the air; this was followed by a relatively great loss. On December 2, when the cake was cut, it was in good condition, and had a fine flavor and the consistency of a soft cooky. The experiment was repeated with small honey cakes, and these also showed no increase in weight before softening. While these experiments are not sufficient for definite conclusions, they indicate that the increased softness of the honey cake is not due to the absorption of water.

Icing made with honey or with part honey and part sugar according to the recipe on page 25 has the same advantage that honey cakes have. Such icing made in this laboratory was found at the end of 10 months to be soft and in as good condition as when originally made. It would, therefore, seem to be suitable for cakes that are to be kept for a long time.

In most of the recipes in foreign cookbooks "potash" (potassium bicarbonate) is recommended for use with honey to raise the dough. This is very similar in its properties to ordinary baking soda (sodium bicarbonate) and seems to have no advantage over it for this purpose. Whatever may have been the conditions in earlier times in Europe, baking soda is a common kitchen commodity in most American homes, and the potassium bicarbonate is almost unknown for household purposes. Both the potassium bicarbonate and baking soda gave much better results in the honey recipes tested than did the baking powder, and naturally, since the acid honey calls for an alkali like soda rather than a mixture of acid and alkali such as baking powder. If baking powder were used it should be in addition to soda enough to neutralize the acid of the honey, not merely as a substitute for soda, just as housekeepers sometimes neutralize sour milk or molasses with soda and then add baking powder to raise the dough.

In the countries where honey cakes have come to perfection spices are used which are somewhat uncommon in this country, and it is reasonable to suppose that long experience has taught a good com-

bination of flavors. Cardamom seed, a rather old-fashioned flavor which is still sometimes found in candies, seems to combine more satisfactorily with the flavor of honey than some of the spices which are better known in our kitchens. It is best, however, to use it in combination with other flavoring materials. The following has been found to be a good combination:

Salt, 1 part by measure.	Ginger, 4 parts.
White pepper, 1 part.	Cardamom, 8 parts.
Nutmeg, 2 parts.	Cinnamon, 16 parts.
Cloves, 2 parts.	

These should be thoroughly mixed and can be made up in quantity and kept ready for use.

Aniseed and coriander seed are also often used in honey cakes in combination with other spices. The following mixture is recommended in a baker's handbook,<sup>1</sup> the amounts given being suitable for 10 pounds of dough:

2 ounces ground cinnamon.	1 ounce finely ground coriander
$\frac{1}{2}$ ounce ground cloves.	seed.
2 ounces aniseed.	

In considering the uses of honey in cookery, it is well to remember that it owes its flavor to bodies which are very volatile and that for this reason it should not be heated unnecessarily hot or unnecessarily long.

In order to learn how honey is used in cookery, standard cookbooks from many countries were examined and many persons familiar with honey cookery were consulted. Innumerable as the recipes were, it was soon found that they belonged mainly to only a few different types, such as breads made with honey, honey cakes made with or without butter, fruits preserved in honey, and sauces and candies made with honey. Many recipes were tested in this laboratory, and some of the more desirable ones were adapted for use in the United States and are published here.

#### BREAD AND MUFFINS.

Honey is not often used in bread making but there is no reason why it may not be used in yeast bread as food for the yeast plant or be substituted for molasses or sugar in varieties of bread which call for such sweetening. A few recipes are here given.

#### BRAN BROWN BREAD.

1 cup white or whole wheat flour.	$\frac{1}{2}$ cup honey.
1 teaspoon soda.	1 cup sour milk.
$\frac{1}{4}$ teaspoon salt.	$\frac{1}{2}$ cup raisins floured.
1 cup bran.	

<sup>1</sup> The Twentieth Century Book for the Progressive Baker. By F. L. Gienandt. Boston, 1913, p. 129.

Sift together the flour, soda, and salt, and add the other ingredients. Steam three hours or bake 40 minutes in a slow oven. If the amount of milk is increased by half, the bread is more delicate and has a somewhat higher food value.

#### STEAMED BROWN BREAD.

1 cup yellow corn meal.	1 teaspoon salt.
2 cups graham flour.	1½ teaspoons soda.
¾ cup honey.	1 tablespoon boiling water.
2 cups sour milk.	1 cup seeded raisins.

Mix together the meal, flour, and salt; add the sour milk and the honey and then the soda dissolved in the boiling water; and the raisins. Steam three hours in covered receptacles, which should be not more than two-thirds full at the beginning of the cooking.

#### HONEY BREAD.

2 cups honey.	4 teaspoons powered cardamom seed.
4 cups rye flour.	2 egg yolks.
1 teaspoon soda.	¼ cup brown sugar.
4 teaspoons aniseed.	
2 teaspoons ginger.	

Sift the flour with the spices and soda and add the other ingredients. Put the dough into shallow buttered pans to the depth of about an inch and bake in a hot oven.

#### HONEY AND NUT BRAN MUFFINS.

½ cup honey.	1 tablespoon melted butter.
1 cup flour.	1½ cups milk.
¼ to ½ teaspoon soda.	¾ cup finely chopped English walnuts.
¼ teaspoon salt.	
2 cups bran.	

Sift together the flour, soda, and salt, and mix them with the bran. Add the other ingredients and bake for 25 or 30 minutes in a hot oven in gem tins. This will make about 16 large muffins, each of which may be considered roughly to be a 100-calorie portion and to contain 2 grams of protein.

#### HONEY AND NUT SANDWICHES.

Mix the honey with pecan meats or almonds minced, and make into sandwiches with small baking-powder biscuits.

#### HONEY AND CREAM CHEESE SANDWICHES.

Mix honey with cream cheese and use as filling for bread or baking-powder biscuit sandwiches. Chopped nut may be added to the honey and cheese if desired.

#### CAKES, COOKIES, ETC.

By far the most general use of honey in cookery is for cakes. Of these there is an almost endless variety, from rich fruit cake in loaves or elaborate pastries with honey filling to simple cookies. As has been pointed out, the honey flavor combines especially well with spices. The presence of honey also makes the cakes keep fresh longer. These two facts probably explain why the honey cakes, which belong mainly to the general order of gingerbreads or spice

cakes, are so largely produced by commercial bakers. Many of these are rather elaborate to make, and for that reason some of the simpler kinds of honey cakes may be preferred by the busy housekeeper.

#### HARD HONEY CAKE.

$\frac{3}{4}$ cup honey.	$\frac{1}{2}$ teaspoon cloves.
$\frac{1}{2}$ cup sugar.	Speck white pepper.
$2\frac{1}{2}$ cups flour.	Speck salt.
1 egg.	$\frac{1}{2}$ teaspoon soda.
$\frac{1}{4}$ teaspoon ginger.	1 tablespoon water.
1 teaspoon cinnamon.	2 ounces blanched almonds cut into
$\frac{1}{2}$ teaspoon ground cardamom seed.	small pieces or chopped.

Sift together the flour and spices, dissolve the soda in the water, beat the egg and combine all the ingredients. Beat or knead the mixture thoroughly. Cook a small sample. If it does not rise sufficiently, add a little more soda and honey; if it falls, add a little more flour. Roll out the dough to the thickness of about three-fourths of an inch and bake in a hot oven. When the cake is done glaze it with a thick sirup of sugar and water and allow it to dry in a slow oven or in some other warm place. While it is still warm, cut it into long strips. Or it may be left in one large cake, to be cut into very thin slices when served. This cake will become very hard on cooling and will not be soft enough to eat for several weeks, but will keep in good condition for an indefinite length of time.

#### BUTTER HONEY CAKE.

$1\frac{1}{2}$ cups honey.	$\frac{1}{2}$ teaspoon salt.
$\frac{1}{2}$ cup butter.	$1\frac{1}{2}$ teaspoons soda.
3 egg yolks.	2 tablespoons orange-flower water
5 cups flour.	(water may be substituted).
2 teaspoons ground cinnamon.	Whites 3 eggs.

Rub together the honey and butter; add the unbeaten yolks and beat thoroughly. Add the flour sifted with the cinnamon and the salt; and the soda dissolved in the orange-flower water. Beat the mixture thoroughly and add the well-beaten whites of the eggs. Bake in shallow tins and cover with frosting made as follows:

#### ORANGE FROSTING FOR BUTTER HONEY CAKE.

Grated rind 1 orange.	1 tablespoon orange juice.
1 teaspoon lemon juice.	1 egg yolk.
	Confectioners' sugar.

Mix all ingredients but the sugar and allow the mixture to stand for an hour. Strain and add confectioners' sugar until the frosting is sufficiently thick to be spread on the cake.

For the cinnamon in the Butter Honey Cake the following mixture of spices may be substituted:

$\frac{1}{2}$ teaspoon ginger.	1 teaspoon cloves.
2 teaspoons cinnamon.	$\frac{1}{4}$ teaspoon nutmeg.
1 teaspoon ground cardamom seed.	$\frac{1}{4}$ teaspoon white pepper.
Chopped citron or nuts may also be added.	

This mixture may also be flavored with ginger, aniseed, or cardamom seed.

## BUTTER HONEY CAKE No. 2.

1 cup honey.	3 cups flour.
$\frac{1}{2}$ cup butter.	$\frac{1}{2}$ to 1 teaspoon soda.
$\frac{1}{2}$ teaspoon ginger.	1 ounce candied orange peel.
$\frac{1}{2}$ teaspoon cinnamon.	1 ounce candied lemon peel, or
1 teaspoon ground cardamom seed.	1 cup seeded raisins.
3 eggs.	

Mix the honey and butter by warming slightly and stirring; add the spices and the yolks of the eggs unbeaten and beat the mixture thoroughly. Add the flour and the soda dissolved in a little water, then the whites of the eggs beaten stiff, and finally the fruit. Bake in a moderate oven.

## NUT HONEY CAKE.

2 cups brown sugar.	$\frac{1}{2}$ teaspoon ground nutmeg.
2 cups honey.	$\frac{1}{2}$ teaspoon allspice.
6 egg yolks.	1 cup chopped raisins.
3 cups flour.	$\frac{1}{2}$ ounce citron cut in small pieces.
Speck of salt.	$\frac{1}{2}$ ounce candied orange peel cut in small pieces.
$1\frac{1}{2}$ teaspoons soda.	$\frac{1}{2}$ pound almonds coarsely chopped.
3 teaspoons ground cinnamon.	Whites of 3 eggs.
$\frac{1}{2}$ teaspoon ground cloves.	

Mix the sugar, honey, and the yolks of the eggs, and beat thoroughly. Sift together the flour, salt, spices, and soda. Combine all ingredients but the whites of the eggs. Beat the whites of the eggs till they are stiff and add them last. Pour the dough to the depth of about half an inch into well-buttered tins, and bake in a slow oven for one-half hour.

## FROSTING FOR NUT HONEY CAKE.

$1\frac{1}{2}$ cups sugar.	$\frac{1}{4}$ cup water.
3 egg whites.	

Boil the sugar and water until the sirup forms a thread when dropped from the spoon. While still hot, pour the sirup over the well-beaten whites of the eggs, beating the mixture until it is of the right consistency to spread.

## CHOCOLATE NUT HONEY CAKE.

To the above cake add 3 ounces of chocolate grated.

## SOFT HONEY CAKE.

$\frac{1}{2}$ cup butter.	1 teaspoon soda.
1 cup honey.	$\frac{1}{2}$ teaspoon cinnamon.
1 egg.	$\frac{1}{2}$ teaspoon ginger.
$\frac{1}{2}$ cup sour milk.	4 cups flour.

Rub the butter and honey together; add the egg well beaten, then the sour milk and the flour sifted with the soda and spices. Bake in a shallow pan.

## HONEY SPONGE CAKE.

$\frac{1}{2}$ cup sugar.	4 eggs.
$\frac{1}{2}$ cup honey.	1 cup sifted flour.

Mix the sugar and honey and boil until the sirup will spin a thread when dropped from the spoon. Pour the sirup over the yolks of the eggs which have been beaten

until light. Beat this mixture until cold; then add the flour, and cut and fold the beaten whites of the eggs into the mixture. Bake for 40 or 50 minutes in a pan lined with buttered paper, in a slow oven.

This cake can be made with a cupful of unheated honey in place of the honey and sugar sirup, but the quality is not quite so good.

#### HONEY POUND CAKE.

A good pound cake can be made by using equal weights of honey, sugar, eggs, flour, and butter. A little soda should be added because of the acidity of the honey, and a good flavoring is cardamom seed and orange-flower water. Or a cake similar to pound cake may be made as follows:

1 cup sugar.	$\frac{1}{2}$ teaspoon powdered cardamom seed.
$\frac{3}{4}$ cup honey.	$\frac{1}{2}$ teaspoon soda.
1 cup butter.	$\frac{1}{2}$ teaspoon orange-flower water.
4 eggs.	
2 cups pastry flour.	

Rub together the butter and sugar, and add the honey. Add the yolks of the eggs well beaten. Finally, add the whites of the eggs, beaten to a stiff froth, and the orange-flower water. Add gradually the flour sifted with the soda and cardamom seed. Beat the mixture for 10 minutes. Put the dough into a warm tin with high sides, and bake in a slow oven one hour.

#### RIBBON CAKE.

##### UTILIZING CANDIED HONEY AS FILLING.

$\frac{1}{2}$ cup butter.	$1\frac{1}{2}$ teaspoons ginger.
2 cups sugar.	$\frac{3}{4}$ teaspoon cinnamon.
4 eggs.	$\frac{1}{2}$ teaspoon cloves.
1 cup milk.	$\frac{1}{2}$ cup raisins, seeded and cut in pieces.
$3\frac{1}{2}$ cups flour.	$\frac{1}{2}$ cup figs, finely chopped.
5 teaspoons baking powder.	1 tablespoon honey.
$1\frac{1}{2}$ teaspoons ground cardamom seed.	

Rub the butter and sugar together and add the yolks of the eggs. Sift together the flour and baking powder and add them to the mixture, alternating them with the milk. Finally, add the whites of the eggs well beaten. Bake two-thirds of the mixture in two layer-cake pans. To the remainder add spices, fruit, and honey, and bake in a layer-cake pan. Put layers together with crystallized honey.

#### HONEY FRUIT CAKE.

3 cups flour.	$1\frac{1}{2}$ pounds currants.
2 teaspoons soda.	1 pound citron.
$3\frac{1}{2}$ cups honey.	1 pound candied cherries.
1 cup butter.	1 pound candied apricots.
6 eggs.	1 pound candied pineapple.
2 teaspoons cinnamon.	$\frac{1}{2}$ cup sour jelly, or
2 teaspoons ginger.	$\frac{1}{2}$ cup white grape juice.
3 teaspoons ground cardamom seed.	2 teaspoons vanilla.
$\frac{1}{2}$ teaspoon cloves.	2 ounces candied orange peel.
3 pounds raisins (seeded).	2 ounces candied lemon peel.

Cut the candied fruit into small pieces, with the exception of the cherries, which should be left whole. Place the fruit in a large dish and sift over it one-half of the flour, mixing thoroughly. Sift the soda with the remainder of the flour. Bring the honey and the butter to boiling point and while still hot add the spices. When the mixture is cool, add the well-beaten yolks of the eggs, then the flour and grape juice or jelly and the well-beaten whites. Finally, add the fruit. The cake should be divided into three or four parts and put into buttered dishes covered with buttered paper tied closely over the tops. Steam for five hours, remove the paper, and bake in a very slow oven for an hour. This makes a very rich cake consisting chiefly of fruit. For the sake of economy, the flour can be increased to even twice the quantity without affecting the quality very much.

#### HONEY FRUIT CAKE No. 2.

4 cups flour.	$\frac{1}{2}$ teaspoon cloves.
3 teaspoons soda.	3 pound raisins (seeded).
2 cups honey.	4 ounces citron.
1 cup butter.	1 pound cranberries.
6 eggs.	1 pound canned pineapple.
2 teaspoons cinnamon.	1 pound dried apricots.
2 teaspoons ginger.	1 pound dried apples.
3 teaspoons ground cardamom seed.	

To prepare the cranberries, pineapples, apricots, and apples, cook each in honey till it is soft; remove from the honey and dry in a very slow oven. A little water should be added to the honey in which the cranberries are cooked, a good proportion of ingredients being equal weights of cranberries, water, and honey. To any honey left over from cooking the fruits add enough honey to make up the total amount called for by the recipe. Mix and cook the cake in the same manner as honey fruit cake No. 1.

#### HONEY DROP CAKES.

$\frac{3}{4}$ cup honey.	$1\frac{1}{2}$ to 2 cups flour.
$\frac{1}{4}$ cup butter.	$\frac{1}{2}$ teaspoon soda.
$\frac{1}{2}$ teaspoon cinnamon.	2 tablespoons water.
$\frac{1}{8}$ teaspoon cloves.	1 cup raisins, cut into small pieces.
1 egg.	

Heat the honey and butter until the butter melts. While the mixture is warm add the spices. When it is cold add part of the flour, the egg well beaten, the soda dissolved in the water, and the raisins. Add enough more flour to make a dough that will hold its shape. Drop by spoonfuls on a buttered tin and bake in a moderate oven.

#### YELLOW HONEY CAKE.

$\frac{1}{2}$ cup sugar.	$\frac{1}{4}$ teaspoon cinnamon.
2 egg yolks.	$\frac{1}{8}$ teaspoon cloves.
$\frac{3}{8}$ cup honey.	$1\frac{1}{2}$ cups flour.

Sift together the flour and the spices. Mix the sugar and egg yolks, add the honey, and then the flour gradually. Roll out thin, moisten the surface with egg white, and mark into small squares. Bake in a moderate oven.

## HONEY COOKIES No. 1.

$\frac{3}{4}$ cup honey.	1 teaspoon allspice.
$\frac{3}{4}$ cup sugar.	2 ounces finely chopped candied orange peel.
$2\frac{1}{2}$ cups flour.	$\frac{1}{2}$ pound walnut meats finely chopped.
$\frac{1}{2}$ teaspoon soda.	
$1\frac{1}{2}$ teaspoons cinnamon.	
1 teaspoon cloves.	

Sift together the flour, spices, and soda, and add the other ingredients. Knead thoroughly, roll out thin, and cut with a biscuit cutter. These cookies are very hard.

## HONEY COOKIES No. 2.

$\frac{3}{4}$ cup honey.	$\frac{1}{2}$ teaspoon salt.
$\frac{3}{4}$ cup sugar.	1 teaspoon ground cinnamon.
$\frac{1}{2}$ cup milk.	$\frac{1}{2}$ cup finely chopped almonds.
3 tablespoons lard.	$\frac{1}{2}$ teaspoon soda or 2 teaspoons baking powder.
2 egg yolks.	
4 cups flour.	

Bring the first four ingredients to the boiling point and allow the mixture to cool. Sift together the flour, cinnamon, and soda or baking powder. Combine all the ingredients. Roll the mixture out thin on a floured board. Cut out and bake in a moderate oven on tins which have been greased and floured. To prepare the tins properly, brush them over with melted butter and sifted flour, turn them over, and shake off as much as possible of the flour.

## HONEY COOKIES No. 3.

$\frac{1}{2}$ cup water.	1 teaspoon soda.
1 pound brown sugar or 2 cups packed solidly.	6 cups flour.
$\frac{1}{2}$ cup lard.	1 teaspoon powdered cardamom seed.
1 cup honey.	1 teaspoon cinnamon.
$\frac{1}{2}$ cup egg yolks.	

Heat the water, sugar, lard, and honey until the lard is melted. When cool, add the yolks of the eggs and the flour, sifted with the soda, and spices. Roll out on a floured board and cut into any desired shape. Place a small piece of citron in the middle of each cooky.

## HONEY BRAN COOKIES No. 1.

2 tablespoons butter.	$\frac{1}{2}$ cup flour.
$\frac{1}{2}$ cup honey.	1 cup bran.
2 eggs.	$\frac{1}{2}$ teaspoon powdered aniseed.
$\frac{1}{4}$ to $\frac{1}{2}$ teaspoon soda.	

Rub together the butter and honey; add the eggs unbeaten and beat the mixture thoroughly. Sift together the flour, soda, and aniseed. Combine all the ingredients; drop from a teaspoon on to a buttered tin and bake in a moderate oven.

## HONEY BRAN COOKIES No. 2.

3 cups bran.	$\frac{1}{4}$ teaspoon ginger.
$\frac{1}{2}$ cup sugar.	$\frac{1}{2}$ cup honey.
$\frac{1}{4}$ to $\frac{1}{2}$ teaspoon soda.	$\frac{1}{2}$ cup milk.
$\frac{1}{4}$ teaspoon cinnamon.	$\frac{1}{2}$ cup melted butter.

Mix the sugar, cinnamon, ginger, and soda with the bran and add the other ingredients. Drop from a spoon upon a buttered pan and bake about 15 minutes.

#### ROLLED HONEY WAFERS No. 1.

$\frac{1}{4}$ cup butter.	$\frac{7}{8}$ cup flour.
$\frac{1}{4}$ cup honey.	$\frac{1}{4}$ teaspoon powdered cardamom or aniseed.

Mix together the butter and honey and add the flour, sifted with the spice. Spread out very thin with a broad long-bladed knife or spatula on a buttered, inverted dripping pan, or on flat tins made for the purpose. Mark off in 3-inch squares and bake in a slow oven until delicately browned. While warm, roll into tubular shape and hold until they cool and, if necessary, until they harden into shape. Honey wafers are not quite so tender as those made with sugar.

#### ROLLED HONEY WAFERS No. 2.

$\frac{1}{4}$ cup honey.	$\frac{7}{8}$ cup flour.
$\frac{1}{4}$ cup sugar.	$\frac{1}{8}$ cup milk.
$\frac{1}{4}$ cup butter.	$\frac{1}{4}$ teaspoon cardamom or aniseed.

Cream the butter; add the sugar, honey, and flour in the order named, and the milk very gradually. Cook as rolled honey wafers No. 1.

#### NOUGAT WAFERS.

$\frac{1}{2}$ cup butter.	$\frac{7}{8}$ cup bread flour.
1 cup brown sugar.	4 teaspoons ginger, or
$\frac{1}{2}$ cup milk.	2 teaspoons powdered cardamom or aniseed.

Rub together the butter and the sugar and add alternately the milk and the flour sifted with the spices. Spread in a very thin layer on the bottom of an inverted dripping pan or on flat tins made for the purpose. Mark off into pieces about an inch wide and 4 inches long and put together in pairs with honey nougat filling made as follows:

#### HONEY FILLING FOR NOUGAT WAFERS.

1 cup sugar.	$\frac{1}{4}$ cup water.
$\frac{1}{2}$ cup honey.	2 egg whites.

Boil the sugar, water, and honey together until the sirup makes a thread when dropped from a spoon, or until drops of it hold their shape when poured into cold water. Beat the eggs to a stiff froth, pour the sirup over them, put the dish holding the mixture in a place where it will keep warm but not cook rapidly, beat until it will hold its shape.

#### HONEY RISSOLES.

##### PASTRY COVERING FOR RISSOLES.

$\frac{1}{3}$ cup lard.	$\frac{3}{4}$ cup water.
2 egg yolks.	$\frac{1}{4}$ cup brown sugar.
1 egg white.	Flour.

Mix together all the ingredients but the flour and add enough of that to make a stiff dough. Roll out as thin as a knife blade, cut into round or square pieces, taking care to avoid the necessity of rolling out the second time, as this is likely to make the dough very tough. A honey filling is used with this dough and is made as follows:

## HONEY FILLING FOR RISSOLES.

1 cup honey.	Rye bread crumbs.
2 ounces candied orange peel.	Aniseed.

Bring the honey to the boiling point, remove from the stove, and add as much bread crumb as it will moisten while it is hot. Add the orange peel and enough powdered aniseed to give a decided flavor. Roll this filling into small balls and lay one in the center of each piece of pastry; fold the pastry over and press the edges together. Bake in a hot oven.

## DESSERTS.

The following recipes suggest ways in which honey can be substituted for sugar or molasses in many common desserts. The ingenious cook with honey to spare can easily work out others if she remembers what was said on pages 11 and 12 about the sweetening power and water and acid content of honey:

## BAKED HONEY CUSTARD.

5 eggs.	$\frac{1}{2}$ teaspoon powdered cinnamon.
$\frac{1}{2}$ cup honey.	$\frac{1}{4}$ teaspoon salt.
4 cups scalded milk.	

Beat the eggs sufficiently to unite the yolks and whites, but not enough to make them foamy. Add the other ingredients and bake in cups or in a large pan in a moderate oven. The baking dishes should be set in water.

## BOILED HONEY CUSTARD.

2 cups milk.	$\frac{1}{2}$ cup honey.
3 egg yolks.	$\frac{1}{2}$ teaspoon salt.

Mix the honey, eggs, and salt. Scald the milk and pour it over the eggs. Cook in a double boiler until the mixture thickens. This custard is suitable for use in place of cream on gelatin desserts, or to be poured over sliced oranges or stewed fruit.

## HONEY PUDDING.

$\frac{1}{2}$ cup honey.	$\frac{1}{2}$ teaspoon ginger.
6 ounces bread crumbs.	2 egg yolks.
$\frac{1}{2}$ cup milk.	2 tablespoons butter.
Rind of half a lemon.	2 egg whites.

Mix the honey and the bread crumbs and add the milk, seasonings, and yolks of the eggs. Beat the mixture thoroughly and then add the butter and the whites of the eggs well beaten. Steam for about two hours in a pudding mold which is not more than three-quarters full.

## HONEY CHARLOTTE RUSSE.

1 quart cream.	$\frac{1}{2}$ cup delicately flavored honey.
6 lady fingers.	

Chill the honey by placing the dish containing it in a pan of ice water. Whip the cream and add it to the honey, mixing the two well. Line a dish with lady fingers and fill it with the honey and cream. Serve very cold.

## HONEY MOUSSE.

4 eggs.	1 cup hot, delicately flavored
1 pint cream.	honey.

Beat the eggs slightly and slowly pour over them the hot honey. Cook until the mixture thickens. When it is cool, add the cream whipped. Put the mixture into a mold, pack in salt and ice, and let it stand three or four hours.

## HONEY ICE CREAM No. 1.

1 quart thin cream. ¾ cup delicately flavored honey.  
 Mix ingredients and freeze.

## HONEY ICE CREAM No. 2.

1 pint milk. 1 cup honey.  
 Yolks 6 eggs. 1 pint cream.

Heat the milk in a double boiler. Beat together the honey and eggs, add the hot milk, return the mixture to the double boiler, and cook it until it thickens. Add the cream and when the mixture is cool, freeze it.

## PRESERVED FRUITS.

## CURRANTS.

Bar-le-Duc currants, an article of commerce often made with honey, sell for a relatively high price, in part no doubt because of the large amount of labor involved in preparing them. The seeds are removed from the currants by a method which mutilates the fruit very slightly; the fruit is then preserved in honey or sugar sirup. Those who wish to take the time to preserve currants in this way will find that a convenient way to remove the seeds is to cut a small slit in the side of each currant and remove the seeds by means of a needle. After this is done, weigh the currants and take an equal weight of honey. Bring the honey to the boiling point, add the currants, and allow them to cook at the boiling point for two or three minutes, or until the skins are tender, being careful not to let the mixture boil violently because this is likely to destroy the shape of the fruit. If the currants are so juicy as to liquefy the honey too much, they may be removed and the sirup reduced to the desired consistency, after which the currants may be replaced.

It is possible, of course, to preserve currants in honey according to the same recipe without the removal of the seeds, but the preserve thus obtained is not nearly so delicate as when the seeds are removed.

## CRANBERRIES.

A very good preserve may be made from cranberries and honey which will remain in good condition for a long time. Take equal weights of cranberries, honey, and water. Cook the berries in the honey and water until the skins are soft. Remove the berries and boil down the sirup until just enough remains to cover the berries. Pour into glasses and cover as you would jelly. The appearance of the cranberries is improved if each one is pricked several times before cooking and if the cooking is slow at first. This gives the sirup an opportunity to penetrate the berries without destroying their form. A satisfactory method is to place all the ingredients in a double boiler and heat them very slowly. If this method is followed, the boiling down of the sirup is even more necessary than when the berries are cooked more rapidly.

## STRAWBERRIES.

Take equal weights of strawberries and honey; mix the two and dry in the sun, or preferably in a warm oven; put into carefully sterilized glasses and cover with paraffin.

## APPLES.

2 quarts apples cut into small pieces. 1 cup vinegar.  
 2 cups honey. 1 teaspoon cinnamon.

Heat the honey, vinegar, and cinnamon together and cook the apples, a few at a time, in the sirup until they become transparent. Pour the sirup which remains after all the fruit is cooked over the apples.

## FRUIT AND HONEY JELLY

A good jelly may be made from winter apples and honey, using a cupful of honey to each cupful of apple juice and proceeding as in ordinary jelly-making. Honey could probably be used with other fruits suitable for jelly, but no definite directions have been worked out in this laboratory. The more delicately flavored honeys are probably best for this purpose, alfalfa giving an especially spicy taste.

## ICING, SAUCES, CANDIES, ETC.

## HONEY ICING.

1 cup granulated sugar.  
 $\frac{1}{4}$  cup water.

$\frac{1}{4}$  cup honey.  
 1 egg white.

Boil together the sugar and the water for a few moments and then add the honey, taking precautions to prevent the mixture from boiling over, as it is likely to do. Cook until drops of the sirup keep their form when poured into cold water, or to about 250° F. Beat the white of the egg until stiff, and when the sirup has cooled slightly pour over the egg, beating the mixture continuously until it will hold its shape. This frosting is suitable for use between layers of cake, but is rather too soft for the top. It remains in good condition and soft enough to be spread for many weeks and, therefore, can be made in large quantities for use as needed. After eight months, such icing made in this laboratory was found to be in good condition and soft enough to cut.

## SAUCE FOR ICE CREAM.

2 tablespoons butter.  
 2 teaspoons cornstarch.

$\frac{1}{2}$  cup honey.

Cook together the cornstarch and butter thoroughly, being careful not to brown them. Add the honey and cook the mixture until it becomes hard when dropped into cold water and until all taste of raw cornstarch has been removed.

## PUDDING SAUCE.

If a small quantity of water be added to the above sauce, its consistency is entirely changed; it becomes thinner and can not be made brittle even by dropping it into cold water. It is suitable for serving on various kinds of puddings.

## STRAWBERRY SAUCE.

Strawberry sauce, for puddings or boiled rice, which is usually made by mixing butter, sugar, and mashed berries, is a good means of securing the strawberry flavor at times when berries are too high-priced to be used in large quantities. The substitution of honey for sugar has proved to be practicable. In fact, it obviates one of the chief difficulties in making this sauce—the tendency to curdle.

2 tablespoons butter.  
 $\frac{3}{4}$  cup mashed strawberries.

$\frac{1}{2}$  cup honey.

Beat together the honey and butter. Add the strawberries slowly, keeping the mixture cool by setting the dish in water. Serve on boiled rice or cottage pudding.

## SALAD DRESSING.

4 egg yolks.  
 2 tablespoons vinegar or lemon juice.  
 2 tablespoons butter.  
 2 tablespoons honey.

1 teaspoon mustard.  
 1 teaspoon salt.  
 Paprika to taste.  
 1 cup cream.

Heat the cream in a double boiler. Beat the eggs, and add to them all the other ingredients but the cream. Pour the cream slowly over the mixture, beating constantly. Pour it into the double boiler and cook until it thickens, or mix all the ingredients but the cream and cook in a double boiler until the mixture thickens. As the dressing is needed combine this mixture with whipped cream. This dressing is particularly suitable for fruit salads.

## NOUGAT.

$\frac{3}{4}$ cup honey.	1 pound almonds.
$\frac{1}{2}$ cup brown sugar.	2 egg whites.

Boil the honey and sugar together until drops of the mixture hold their shape when poured into cold water. Add the whites of the eggs, well beaten, and cook very slowly, stirring constantly, until the mixture becomes brittle when dropped into water. Add the almonds and cool under a weight. The candy can be broken into pieces, or may be cut and wrapped in waxed paper.

## HONEY FUDGE.

2 cups sugar.	$\frac{1}{2}$ cup water.
$\frac{1}{2}$ cup honey.	2 egg whites.
1 teaspoon of vanilla extract.	

Boil together the sugar, honey, and water until the sirup spins a thread when dropped from a spoon (about 250° F.). Pour the sirup over the well-beaten whites of the eggs, beating continuously and until the mixture crystallizes, adding the flavoring after the mixture has cooled a little. Drop in small pieces on buttered or paraffin paper. The vanilla may be omitted.

## HONEY CARAMELS.

2 cups granulated sugar.	$\frac{1}{2}$ cup honey.
$\frac{1}{2}$ cup cream or milk.	$\frac{1}{2}$ cup butter.

Mix the ingredients; heat and stir until the sugar is dissolved; then cook without stirring until a firm ball can be formed from a little of the mixture dropped into cold water. Beat the mixture until it crystallizes, pour into buttered pans, and cut into squares. The addition of pecan nuts improves these caramels.

## HONEY POPCORN BALLS.

Honey can be heated up to about 245° F. without being greatly changed in color or flavor. If it is heated carefully most of the water is expelled. The honey then becomes hard on cooling and can be used for making popcorn balls. To make them, dip the popped corn into the hot honey, shape into balls and cool. Honey popcorn balls absorb moisture on standing in the air. They must therefore be either kept very closely covered or reheated and dried before being used.





